REMARKS

Applicant is in receipt of the Office Action mailed September 6, 2006.

Claim Status

Claims 7-10, 17-22, and 25-33 were pending prior to entry of the present amendment.

Claims 7, 17, 25, 27-29, and 31 have been amended.

Claims 1-6, 11-16, 23-24, and 33 have been canceled.

Claims 7-10, 17-22, and 25-32 are now pending.

Claim Rejections

Claims 7-9 were rejected under 35 U.S.C. §101 because they do not recite statutory subject matter.

Independent claims 7 and 17 were rejected under 35 U.S.C. §102(e) as being anticipated by Hamburg (USPN 6028583).

Independent claims 7 and 17 were also rejected under 35 U.S.C. §103(a) as unpatentable over Grzeszczuk et al. (USPN 6667957; hereinafter referred to as Grzeszczuk).

Independent claims 7 and 17 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Morein (USPN 6457034) in view of Haeberli et al., Journal Publication (Computer Graphics, v24, n4, August 1990, herein referred to as Haeberli), and further in view of MacInnis et al. (USPN 6608630; hereinafter referred to as MacInnis).

Independent claim 25 was rejected under 35 U.S.C. §103(a) as obvious over Grzeszczuk in view of Adler et al. (USPN 6028907; hereinafter referred to as Adler).

Independent claim 25 was also rejected under 35 U.S.C. §103(a) as being unpatentable over Morein, Haeberli, and MacInnis as applied to claim 17, and further in view of Adler.

Dependent claims 8-10, 18-22, and 26-33 were rejected under 35 U.S.C. §103(a) as being unpatentable over various combinations of Morein, Haeberli, Adler, Murata et al. (USPN 5621866; hereinafter referred to as Murata), Takeuchi et al. (US Pub. 2002/0082081; hereinafter referred to as Takeuchi), and McReynolds ("Programming with OpenGL: Advanced Techniques" Siggraph 1997, page 112).

Dependent claim 29 was also rejected as a duplicate of claim 28 (see page 20 of current Office Action).

Claim 7 as amended recites: A method comprising:

(a) reading a first stream of image pixels corresponding to an image X_K from an image memory;

(b) reading a second stream of pixels corresponding to an image A_K from an accumulation buffer;

(c) blending each image pixel of the image X_K with the corresponding pixel of the image A_K based on a programmable scale factor provided for each image pixel, and thus, generating a third stream of output pixels defining an image A_{K+1};

(d) transferring the third stream of output pixels to the accumulation buffer to replace the image A_K with the image A_{K+1};

(e) repeating (a), (b), (c) and (d) for each image after the first image of a sequence of N images X_K, to provide a final image A_N, wherein image A_N is an accumulated blending of the N images, and wherein $K = 0, 1, 2, \ldots, N-1$; and

(f) storing the final image A_N in the image memory for subsequent display.

Claim 7 as amended overcomes the rejection under 35 U.S.C. §101 by providing the concrete, tangible, and practical application of "storing the final blended image in the image memory for subsequent display".

Claim 7 as amended also overcomes the rejections under 35 U.S.C. §102 and 103.

Hamburg, Grzeszczuk, Morein, Haeberli, and MacInnis do not teach either singly or in combinations "blending each image pixel of the image X_K with the corresponding pixel of the image A_K based on a programmable scale factor provided for each image pixel, and thus, generating a third stream of output pixels defining an image A_{K+1}". In

fact, Hamburg, Grzeszczuk, Morein, Haeberli, and MacInnis are silent on a programmable scale factor. Support for this limitation may be found in Applicants' Figure 11 and at page 22, lines 10-15 of Applicants' specification:

> "To implement an accumulate operation (e.g. a GL_ACCUM operation), a component of an image pixel from the image buffer in the frame buffer 22 is provided to Input1. The value zero may be provided to Input2. A <u>programmable scale factor</u> may be provided to Input3. The corresponding component of accumulation buffer pixel $A_K(I,J)$ may be provided to Input6 (via multiplexor 445). The output value OUTPUT is transferred to the accumulation buffer."

In addition, Morein, Haeberli, MacInnis, Grzeszczuk, and Hamburg either singly or in combination do not teach or render obvious "(d) transferring the third stream of output pixels to the accumulation buffer to replace the image A_K with the image A_{K+1}; (e) repeating (a), (b), (c) and (d) for each image after the first image of a sequence of N images X_K, to provide a final image A_N, wherein image A_N is an accumulated blending of the N images, and wherein $K = 0, 1, 2, \ldots, N-1$".

Furthermore, Morein does not teach a blending process that includes "reading a second stream of pixels corresponding to an image A_K from an accumulation buffer and blending each image pixel of the image X_K with the corresponding pixel of the image A_K". In fact, the blending process taught by Morein does not <u>read a stream of pixels from an accumulation buffer</u> corresponding to an image A_K, but instead accomplishes a blending operation by simply adding image X_K pixel data directly to the accumulation buffer as described at column 5, line 61 through column 6, line 12:

> "The first accumulation buffer 170 stores an accumulation data set for each pixel of the frame. Each accumulation data set includes accumulated color data and a counter value. Blending color data from the drawing buffer 140 with that stored in the first accumulation buffer 170 may be <u>accomplished by simply **adding** the color data stored in the drawing buffer 140 to the accumulated color data stored in the first accumulation buffer 170.</u> For example, if the color data includes red, green, and blue color portions, the value for each of these color portions in the drawing buffer 140 will be added to the value for each of the portions currently stored within the first accumulation buffer 170. The counter value in the first accumulation buffer 170 corresponding to the pixel to which the color data from the drawing buffer 140 has been added is then incremented to reflect that another set of color data is included for that pixel in the accumulation buffer 170. Thus, if

data from four images is accumulated for a pixel within the first accumulation buffer 170, the counter value for that pixel will reflect a value of four."

Nor does Morein teach a process for blending "each image pixel of the image X_K with the corresponding pixel of the image A_K", but instead only blends selected pixels for which a valid indication has been set as described at column 5, lines 47-60:

> "When the controller 160 finds a pixel block indicator within the mask buffer 150 that is set, the controller 160 blends the color data for the valid pixels (as indicated by the valid indications in the drawing buffer) in the pixel block corresponding to the set pixel block indicator with the information corresponding to those pixels within the first accumulation buffer 170. In order to determine for which pixels valid color data exists within the drawing buffer 140, the controller 160 must examine both the pixel block indicators within the mask buffer 150 and the valid indications for the pixels stored within the drawing buffer 140. Both the pixel block indicator for a pixel block and the valid indication for a pixel within the pixel block must be set for valid data to be stored within the drawing buffer 140 for that pixel."

In addition, the blending process as taught by Morein, Haeberli, and MacInnis either singly or in combination does not teach or render obvious generating a "third stream of output pixels defining an image A_{K+1}" nor transfering the "third stream of output pixels to the accumulation buffer". In fact, the blending process as taught by Morein does not generate an image A_{K+1} nor transfer the image A_{K+1} to the accumulation buffer, but instead adds data from each image to the accumulation buffer and updates the counter value for each image as described at column 2, lines 7-37:

> "the accumulation buffer stores an accumulation data set for each pixel of the frame. Preferably, each accumulation data set includes accumulated color data and a counter value…When all of the images for a particular accumulation operation have been accumulated in the accumulation buffer, the color values stored in the accumulation buffer are normalized by dividing the color data value for a particular pixel by the counter value corresponding to the particular pixel."

The blending process as taught by Haeberli is similar to that of Morein in that for each new image, pixel data is added directly to the accumulation buffer as described at page 311 in Section 3.2:

> "The accumulation buffer provides 16 bits to store each red, green, blue, and alpha color component, for a total of 64 bits per pixel. The primary operations that may be applied to the Accumulation Buffer are: …… 2. Add with weight. Each

> pixel in the drawing buffer is added to the accumulation Buffer after being multiplied by a floating-point weight that may be positive or negative."

MacInnis is silent on the use of an accumulation buffer to blend a sequence of images using the method as recited in claim 7.

Grzeszczuk does not teach a blending process for a sequence of N images, that provides a "final image A_N, wherein image A_N is an accumulated blending of the N images. The current Office Action cites col. 3, lines 20-40 as teaching a series of images:

> "…may vary from point to point and viewing direction to viewing direction, since this is typically the case for real objects.
>
> Additional parameters may be included, such as to specify a location on the interior of the object, to specify motion of the object in space, and for other reasons that will be apparent to those skilled in the art. Since many real-world objects are viewed under constant lighting, such as an object illuminated by the sun or by fixed lighting in a room, the present disclosure will emphasize fixed lighting. However, the invention is equally applicable to variable lighting conditions, such as when lighting varies with time, location on the object, or viewing direction. Each of these additional factors adds a dimension to the graphical representation, so that representations with six or more dimensions may be common. Typically, multidimensional representations of six or higher dimensions become complicated to store and manipulate, requiring significant computing memory and communications capability.
>
> The reflectance representation may be based on analytical approaches, such as parametric reflectance models, or…"

However, there is no teaching in this cited passage or elsewhere in Grzeszczuk of a blending process for a sequence of N images, that provides a "final image A_N, wherein image A_N is an accumulated blending of the N images".

The current Office Action does not cite any particular passage of Hamburg, but states at page 5, lines 4-7, that "Hamburg shows that the first and second intermediate images are blended to generate the third intermediate image, and that [the] third intermediate image is then composited with layers (C+k+1), where each layer is an image, and <u>clearly there is a sequence of images</u>". However, Hamburg does not teach a blending process for a sequence of N images, that provides a "final image A_N, wherein image A_N is an accumulated blending of the N images".

Applicant also respectfully submits that there is no teaching, suggestion, or motivation to combine Morein, Haeberli, and MacInnis in any of these references or in the prior art. As held by the U.S. Court of Appeals for the Federal Circuit in *Ecolochem Inc. v. Southern California Edison Co.*, an obviousness claim that lacks evidence of a suggestion or motivation for one of skill in the art to combine prior art references to produce the claimed invention is defective as hindsight analysis. Furthermore, Applicant respectfully submits that it is non-obvious to combine Morein, Haeberli, and MacInnis.

Furthermore, the showing of a suggestion, teaching, or motivation to combine prior teachings "must be clear and particular. . .Broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence'." *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). The art must fairly teach or suggest to one to make the specific combination as claimed. <u>That one achieves an improved result by making such a combination is no more than hindsight without an **initial** suggestion to make the combination</u>. Applicant respectfully submits that there is no initial suggestion in the prior art for combining Morein, Haeberli, and MacInnis, and that even were the three references combined, they would not produce the features of claim 7.

Therefore, Applicant submits that claim 7 and its dependent claims are non-obvious and patentably distinguished over Hamburg, Grzeszczuk, Morein, Haeberli, and MacInnis for at least the reasons given above.

Applicant further submits that claim 17 and its dependent claims are also non-obvious and patentably distinguished over Hamburg, Grzeszczuk, Morein, Haeberli, and MacInnis for at least one or more of the reasons given above in support of claim 7.

Dependent claim 22 was rejected as being unpatentable over Morein in view of Haeberli and MacInnis, and further in view of McReynolds. However, the current office Action states at page 14 that Morein, Haeberli, and MacInnis "does not explicitly teach the color precision of the accumulation buffer is greater than the color precision of the image buffer". At page 15, the current Office Action states that McReynolds does teach "in order to maintain accuracy over many blending operations, the accumulation buffer

has a higher number of bits per color component than a typical color buffer". Applicants respectfully assert, however, that the limitations of claim 22 "wherein a color precision of the accumulation buffer is at least ΔN larger than a color precision of the image memory, wherein ΔN is the base two logarithm of the maximum number of images to be blended into the accumulation buffer" is not obvious based on this teaching of McReynolds.

Applicants further submit that claim 25 and its dependent claims are also non-obvious and patentably distinguished over Grzeszczuk, Morein, Haeberli, and MacInnis for at least one or more of the reasons given above in support of claim 7.

Dependent claim 29 was rejected as a duplicate of claim 28 at page 20 of the current office action. However, Applicants note that each image in a sequence of images is comprised of multiple objects. Therefore, in claim 28 "the weight is a non-negative value less than or equal to 1 that is individually specified for <u>each image</u>", whereas in claim 29 "the weight is a non-negative value less than or equal to 1 that is individually specified for <u>each object</u>". Therefore, Applicants respectfully assert that claim 28 is patentably distinct from claim 29.

CONCLUSION

Applicant submits the application is in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert & Goetzel PC Deposit Account No. 50-1505/5681-14000/JCH.

Respectfully submitted,

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